

1-67. Cancelled.

68. (New) A method of forming a gallium nitride semiconductor structure comprising:

converting a surface of a silicon substrate to a silicon-based compound to form a converted surface;

forming a buffer layer comprising aluminum and nitrogen on the converted surface; and

forming a gallium nitride region on the buffer layer.

69. (New) The method of claim 68, further comprising forming a device in the gallium nitride region.

70. (New) The method of claim 69, further comprising forming a device in the silicon substrate.

71. (New) The method of claim 68, wherein at least a portion of the gallium nitride region has a defect density of less than  $10^9 \text{ cm}^{-2}$ .

72. (New) The method of claim 71, wherein the portion of the gallium nitride region having a defect density of less than  $10^9 \text{ cm}^{-2}$  extends continuously over the substrate.

73. (New) The method of claim 68, wherein at least a portion of gallium nitride region extends continuously over the substrate.

74. (New) The method of claim 68, wherein buffer layer comprises aluminum nitride.

75. (New) The method of claim 68, wherein the substrate is a bulk silicon substrate.

76. (New) The method of claim 68, wherein the substrate is an SOI substrate.

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77. (New) The method of claim 68, wherein the substrate is a SIMOX substrate.

78. (New) The method of claim 68, comprising converting the entire surface of the silicon substrate to the silicon-based compound.

79. (New) The method of claim 68, wherein the gallium nitride region has a thickness of between about 0.5 and about 2.0 micron.

80. (New) The method of claim 68, wherein the silicon-based compound is silicon carbide.

81. (New) The method of claim 68, wherein the step of forming the gallium nitride region on the buffer layer includes laterally growing at least a portion of the gallium nitride region.

82. (New) The method of claim 68, wherein the step of forming the gallium nitride region on the buffer layer includes vertically growing at least a portion of the gallium nitride region.

83. (New) The method of claim 68, comprising forming the buffer layer comprising aluminum and nitrogen directly on the converted surface.

84. (New) The method of claim 68, comprising forming the gallium nitride region directly on the buffer layer.